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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

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APPLICATION ELEMENTS FOR:
PRODUCTION SYSTEM FOR PRINTED WIRING BOARD

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1. [XX] Fee Transmittal Form (Incorporated within this form)
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2. [XX] Specification Total Pages [37]

3. [XX] Drawing(s) (35 USC 113) Total Sheets [11]

4. [XX] Oath or Declaration Total Pages [5]

a. [XX] Newly executed (original)

b. [ ] Copy from prior application (37 CFR 1.63(d)
(for continuation/divisional with Box 17 completed).

i. [ ] Deletion of Inventor(s)
Signed statement attached deleting inventor(s) named in prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

5. [ ] Incorporation by reference (useable if box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program (Appendix)

7. [ ] Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)

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ACCOMPANYING APPLICATION PARTS

8. [XX] Assignment Papers (cover sheet and document(s))

9. [ ] 37 CFR 3.73(b) Statement (when there is an assignee) [XX] Power of Attorney

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	PAGE 2 OF 3

10. [ ] English translation Document (if applicable)

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13. [XX] Return Receipt Postcard (MPEP 503)

14. [ ] Small Entity Status is claimed.

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a. Priority of _____ application no. _____ filed on _____ is claimed under 35 USC 119.
The certified copies/copy have/has been filed in prior application Serial No. _____.
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PRODUCTION SYSTEM FOR PRINTED WIRING BOARD

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to production system for printed wiring board.

2. Description of the related art

Conventionally, generally the printed wiring board has been produced in a following manner. That is, a substrate material in which a conductive film is formed on the surface of an insulated plate thereof (it is called "raw material") is prepared. A circuit pattern, solder resist and the like are formed on the raw material. After that, an excessive portion of the raw material is cut off and removed and then, a final product of the printed wiring board is obtained.

A size and a shape of the raw material is determined to a specific size and a specific shape as a predetermined manufacturing block. A manufacturer of the printed wiring board determines a layout for a final product of printed wiring board on that predetermined manufacturing block. This work is called "panelizing".

In this panelizing, according to the predetermined manufacturing block, positions of a circuit pattern, solder resist and the like to be formed on the material and cutting lines from the material for the final product and the like are determined.

A result of the panelizing is reflected on a group of

production units for use in manufacturing process of the printed wiring board. According to the result of panelizing, for example, an art work film for forming etching resist and solder resist for forming a circuit pattern is created and then, setting for forming the circuit or solder resist are carried out in respective units for use in circuit forming process and solder resist forming process by using the created art work film. Further, setting for operation based on the result of the panelizing is carried out in a unit for drilling the raw material, a punching unit, and cutting unit. If an instruction for manufacturing a printed wiring board (this instruction is called "charge") is given to a group of manufacturing units for use in manufacturing process, the respective units execute manufacturing processes following the result of panelizing.

If a large number of printed wiring boards are intended to be produced, a plurality of the printed wiring boards of the same kind are panelized in the predetermined manufacturing block in order to reduce excessive part of the raw material and obtain as large a number of the printed wiring boards as possible from the predetermined manufacturing block (panelizing for the same kind).

As a special case, if multiple kinds of the printed wiring boards are used as parts of the same machine (for example, it is intended to manufacture multiple kinds of printed wiring boards for TV and portable telephone), a predetermined manufacturing block is panelized for each printed wiring board (panelizing for different shapes) in order to obtain multiple

kinds of the printed wiring boards from the predetermined manufacturing block.

According to the above described conventional arts, an art work film is created corresponding to a result of panelizing. The art work film is expensive and requires much attention for storage. For the reason, the content of the panelizing in the predetermined manufacturing block has never been changed depending on a manufacturing request for the printed wiring board.

Thus, if panelizing for the same shape is carried out in the predetermined manufacturing block, an art work film corresponding to that panelizing is created, and regardless of the quantity of boards requested to be manufactured, just printed wiring boards of multiple of a number of those panelized are manufactured. For the reason, if a manufacturing quantity of the printed wiring boards cannot be divided completely by a number of boards panelized in the predetermined manufacturing block according to the same shape, excessive printed wiring boards (it is called "incidental products") are generated. Generation of such incidental product is not favorable in viewpoints of production cost and other cost for storage, for example.

In recent years, with diversification of users, the kinds of the printed wiring boards have been increasing and the life cycle of the printed wiring board has been reduced rapidly. Thus, the production of the printed wiring board has been changing from a conventional production for few kinds in large

quantity of each to production for many kinds in small quantity of each. Accompanied by this trend, ultra minority product, which is requested to be manufactured in extremely small quantity (1 or 2), has been generated. If, to manufacture this ultra minority product, a single ultra minority product is panelized in a predetermined manufacturing block, material which is removed and thrown away by cutting out that product increases, which is not favorable in viewpoints of production cost.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a production system for the printed wiring board capable of suppressing generation of an incidental product and waste of material as compared to the conventional manufacturing system.

The present invention applies the following structures to achieve the above object. That is, according to an aspect of the present invention, there is provided a manufacturing system for printed wiring board comprising: a schedule data storage unit storing multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof; a detecting unit detecting printed wiring boards of fraction which should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule

data; a condition data storage unit storing a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block; a dividing unit dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and a determining unit determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

The aforementioned detecting unit can, if a manufacturing quantity of the printed wiring boards of a certain kind cannot be divided completely by a maximum number of the printed wiring boards which can be laid out in a single predetermined manufacturing block, detect printed wiring boards corresponding to a number smaller than the maximum number or an excess as printed wiring boards of the fraction.

The manufacturing condition data is, for example, data produced by combining manufacturing request person's condition and manufacturer's condition. The manufacturing request person's condition is, for example, shipment date. The manufacturer's condition is, for example, number of layers of the printed wiring boards.

The present invention may further comprise: CAD data creating unit creating CAD data corresponding to a combination determined by the determining unit; and CAD data converting unit for creating CAM data or CAT data corresponding to CAD data created by the CAD data creating unit. The present invention

may still further comprise manufacturing unit group carrying out manufacturing process for the printed wiring board, using the CAM data or CAT data created by the CAD data converting unit.

According to another aspect of the present invention, there is provided a manufacturing method for printed wiring board comprising the steps of: reading multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof; detecting printed wiring boards of fraction which should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule data; reading a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block; dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

According to still another aspect of the present invention, there is provided a computer-readable recording medium for recording a computer program for making a computer to carry out the steps of: reading multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof; detecting printed wiring boards of fraction which

should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule data; reading a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block; dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

According to the manufacturing system for the printed wiring board of the present invention, it is possible to suppress generation of incidental products and waste of material as compared to a conventional manufacturing system.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an explanatory diagram of a manufacturing process for printed wiring board;

Fig. 2 is a configuration diagram of manufacturing system for the printed wiring board;

Fig. 3 is a partial configuration diagram of production control system;

Fig. 4 is a diagram showing an example of order remainder list;

Fig. 5 is a functional block diagram of PAS system;

Fig. 6 is a flow chart showing a processing by production

control system;

Fig. 7 is an explanatory diagram of fraction processing;

Fig. 8 is a flow chart showing grouping processing;

Fig. 9 is an explanatory diagram for pairing processing;

Fig. 10 is a flow chart showing a processing by PAS system; and

Fig. 11 is an explanatory diagram for disposing by PAS system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, the preferred embodiments of the present invention will be described with reference to the accompanying drawings.

[Manufacturing process for printed wiring board]

First, the manufacturing process for the printed wiring board according to the embodiment of the present invention will be described. Fig. 1 is an explanatory diagram showing an example of the manufacturing process for the printed wiring board.

In the manufacturing process for the printed wiring board, first of all, copper - clad laminate for internal layer circuit (girt laminate for internal layer circuits: hereinafter referred to as "substrate" or "board") is prepared. Next, a conductor pattern for the internal layer circuit is formed on this board (internal layer circuit forming process: step S1). Next, a short-circuit or breaking of wire in the internal layer circuit is inspected (auto optical inspection (AOI): step S2).

Then, the internal inspection (step S3) is carried out.

Next, a multiplicity of the boards in which the internal layer circuit is formed are combined and laminated (lamination process: step S4). Next, a through hole is formed in the laminated boards (drilling process: step S5). Next, the laminated board is plated with copper and respective internal layer circuits are connected by the conductors (copper plating process: step S6). Next, a conductor pattern for outer layer circuit is formed on a single surface or both surfaces of the laminated board (outer layer circuit forming process: step S7). After that, AOI (step S8) and intermediate inspection (step S9) are carried out.

Next, solder resist is formed on the surface of the laminated board in which the outer layer circuit is formed (solder resist forming process: step S10). Next, mark, such as character or symbol, is printed on the formed solder resist (marking process: step S11). After that, the laminated board is incised (NC V cut process: S12) and individual pieces are cut out from the laminated board along an outline of the printed wiring board (NC router process: step S13).

After that, wire logic test (flying prover: step S14) is carried out and then, a final test (step S15) is executed. If the final test is cleared, a multi-layer printed wiring board is completed and shipped as a product.

According to this embodiment, in the above described internal layer circuit forming process (step S1) and outer layer circuit forming process (step S7), photo-setting optical

sensitive film is laminated on a board and laser beam is irradiated on this optical sensitive film according to computer aided manufacturing (CAM) data indicating a conductor pattern so as to form etching resist.

Further, in the solder resist forming process (step S10), a laser beam according to the CAM data indicating a pattern of the solder resist is irradiated to the photo-hardening optical sensitive film so as to form a shielding mask. Then, the photo-hardening solder resist material coated on the laminated board is exposed using this shielding mask.

In the marking process (step S11), a laser beam is irradiated to photo-hardening marking ink coated on the laminated board according to the CAM data, so that marking ink corresponding to a place desired to leave is hardened.

As described above, in the manufacturing process of this embodiment, use of the art work film is excluded from the internal layer circuit forming process (step S1), outer layer circuit forming process (step S7), solder resist forming process S10 and marking process (step S11).

Meanwhile, an inventor of the present invention calls a method for drawing a conductor pattern, solder resist pattern and marking pattern for a circuit directly using the CAM data without using the art work film "DDI (data direct image)".

[Production system for printed wiring board]

Next, production system for carrying out the above manufacturing process for the printed wiring board will be described. Fig. 2 is an explanatory diagram of the production

system. As shown in Fig. 2, the production system comprises production control system A, PAS system B and manufacturing unit group C.

<Production control system>

The production control system A is general-purpose computer such as work station. Fig. 3 is a block diagram showing major part of the production control system A. In Fig. 3, the production control system A comprises CPU 31 and recording medium 32. The CPU 31 realizes multiple functions by carrying out a production control program.

For example, the CPU 31 makes up a schedule for manufacturing of the printed wiring board and panelize a final product with respect to the predetermined manufacturing block according to a result of this scheduling. Then, the CPU 31 controls operations of the PAS system B and manufacturing unit group C according to the result of the panelizing.

Further, the CPU 31 monitors a production condition of the manufacturing unit group C by receiving data (production condition data) concerning production condition of respective apparatuses 11-19 of the manufacturing unit group C. By giving an instruction to the PAS system B according to this monitor result, the CPU 31 controls the operations of the PAS system B and manufacturing unit group C.

The recording medium 32 is comprised of RAM, hard disk, magnetic tape and the like. The recording medium 32 holds a production control program to be executed by the CPU 31 and is used as a working region of the CPU 31.

The recording medium 32 holds panelizing drawing data library 34, single piece drawing number data library 35, order remainder list 36, customer filter (panelize) condition data 37, and manufacturer filter (panelize) condition data 38 as data group used in the CPU 31.

The panelizing data library 34 holds plural kinds of predetermined manufacturing data for the printed wiring board and home position data (panelize home position data) for final product of the printed wiring board to be laid out in the predetermined manufacturing block (see Fig. 11(A)). The predetermined manufacturing block data is created corresponding to an outline of the internal layer circuit copper clad laminate as material for the printed wiring board.

The single piece drawing number data library 35 holds final product data of multiple kinds of the printed wiring boards (see Fig. 11(B)). The final product data is graphic data indicating the configuration (layer structure including the number of layers, circuit pattern, solder resist pattern and the like) of the final product of the printed wiring board. Drawing numbers are allocated to each final product data in order to specify the kind of the printed wiring board and the CPU 31 controls the final product data using this drawing number.

Meanwhile, the panelizing drawing data and final product data are CAD data created by a CAD system (not shown) depending on a manufacturing request from the customer. The created CAD data is supplied from the CAD system to the production control

system A and recorded in the recording medium 32.

Fig. 4 is an explanatory diagram showing an example of order remainder list 36. The order remainder list 36 stores a multiple pieces of records comprising drawing number, production quantity, order reception date, shipment date and remarks of printed wiring boards requested to be manufactured by the customer.

The record is stored each time when the printed wiring board is ordered, and if a final product is shipped to meet a request, a corresponding record is deleted from the order remainder list 36. If a defect is contained in the manufactured printed wiring board and the printed wiring board is produced newly, a record concerning that reproduced printed wiring board is stored. For example, a record of item 1 in Fig. 4 indicates a record concerning a printed wiring board to be reproduced.

Returning to Fig. 3, the customer filter condition data 37 refers to data indicating customer condition for including a printed wiring board in a certain group, if multiple kinds of the printed wiring boards to be panelized in different ways should be classified to multiple groups (grouping processing).

The customer filter condition includes, for example,

(1) shipment date

(2) parts to be mounted by customers (customer's handling date).

The customer filter conditions (1) and (2) are used independently or combined as required.

The manufacturer filter condition data 37 is data indicating manufacturer's condition for incorporating a

printed wiring board in one of predetermined groups when the grouping process about the printed wiring board is carried out.

The manufacturer filter condition includes, for example,

(1) number of layers in the printed wiring board

(2) panelize drawing (outline drawing)

(3) presence or absence of Z0 (impedance control)

(4) V cut

(5) drill diameter (inner diameter of through hole)

(6) specification for destination

(7) scaling

(8) presence or absence of solder coat

(9) AOI condition.

According to this embodiment, an independent manufacturer filter condition is (1) number of layers in the printed wiring board. Other conditions (2)-(9) are combined with the condition (1) as required. For example, if it is intended to lay out multiple kinds of the printed wiring boards having the same outline on a single predetermined manufacturing block, the above described (2) panelize drawing (outline drawing) is incorporated in the manufacturer filter condition.

If the multiple kinds of the printed wiring boards to be manufactured are all single-layer printed wiring boards, the conditions (2)-(9) or a combination thereof are used as the manufacturer filter condition.

<PAS system>

The PAS system B is a computer for generating computer aided manufacturing (CAM) data or computer aided testing (CAT)

data from computer aided design (CAD) data concerning a printed wiring board to be manufactured. Fig. 5 is a functional block diagram of the PAS system B, and the PAS system B comprises a disposing processing unit 41, a data converting unit 42 and a memory 43.

The disposing processing unit 41 disposes the final product data on the panelize data according to an instruction from the production control system A (CPU 31) (see Fig. 11(C)). The data converting unit 42 converts corresponding CAD data to CAM data or CAT data following a result of processing of the disposing processing unit 41.

The memory 43 accumulates the CAM data and CAT data obtained by the disposing processing unit 41 and data converting unit 42. The CAM data and CAT data accumulated in the memory 43 are supplied to the manufacturing unit group C according to an instruction from the production control system A or a request from the manufacturing unit group C.

The disposing processing unit 41 and data converting unit 42 are functions which are achieved when a program is carried out by a CPU (not shown) composing the PAS system B.

<Manufacturing unit group>

Returning to Fig. 2, the manufacturing unit group C carries out manufacturing process shown in Fig. 2 according to the CAD data, CAM data or CAT data supplied from the PAS system B. Meanwhile, Fig. 2 shows only manufacturing units which are operated based on the CAD data, CAM data or CAT data from the PAS system B.

More specifically, Fig. 2 shows an internal layer circuit forming unit 11 for carrying out internal layer circuit forming process (step S1), an internal layer inspecting unit 12 for carrying out AOI (step S2), a drilling unit 13 for carrying out drilling process (step S5), a outer layer circuit forming unit 14 for carrying out outer layer circuit forming process (step S7) and a outer layer inspecting unit 15 for carrying out AOI (step S8).

Further, Fig. 1 shows a solder resist (SR) forming unit 16 for carrying out solder resist forming process (step S10), a marking unit 17 for carrying out marking process (step S11), an outline processing unit 18 for carrying out NCV cut process (step S12) and NC router process (step S13) and a wire logic testing unit 19 for carrying out flying prover (step S14).

Buffer memories 21-29 are provided between the respective units 11-19 and PAS system B. The respective buffer memories 21-29 accumulate the CAM data and CAT data supplied from the PAS system B.

[Processing by production control system]

Next, processing by the production control system A will be described. The processing by the production control system A is achieved when the CPU 31 shown in Fig. 3 carries out the production control program recorded in the recording medium 32.

Fig. 6 is a flow chart showing the processing by the production control system A. The CPU 31 of the production control system A carries out a processing shown in Fig. 6 each time when schedule for manufacturing of the printed wiring board

is made, for example.

First, the CPU 31 reads out the order remainder list 36 stored in the recording medium (not shown) (step S101). Next, the production control system A sorts multiple records stored in the order remainder list in the order of shipment date (step S102).

Next, the CPU 31 carries out fraction processing (step S103). That is, the CPU 31 reads out panelize drawing (predetermined manufacturing block) data corresponding to a desired drawing number from the panelize data library 34, and at the same time, reads out a final product data corresponding to a desired drawing number from the single piece drawing number data library 35. Subsequently, the CPU 31 lays out the final product on a panelize drawing according to the quantity for manufacturing.

For example, if the fraction processing is carried out for the order remainder list 36 shown in Fig. 4, a panelize drawing (predetermined manufacturing block) corresponding to a drawing number "E320-1234-T567/01". At this time, when four pieces of the final products having the drawing number "E320-1234-T567/01" can be laid out on the panelize drawing, two, which is obtained when an order remainder 10 of the drawing number "E320-1234-T567/01" is divided by 4, is fraction as shown in Fig. 7.

As a result, of 10 pieces of the drawing number "E320-1234-T567/01", eight pieces are determined to be manufactured according to the same panelizing, in which four

pieces are to be created, and the processing proceeds to step S106. On the other hand, two pieces of drawing number "E320-1234-T567/01" as the fraction are subjected to grouping (filter) process at step S104.

The CPU 31 applies a remainder produced when the number for manufacturing is divided by a number of the pieces which can be panelized according to the same shape in the predetermined manufacturing block as a fraction. Thereby, the CPU 31 classifies printed wiring boards to be manufactured to fraction and non-fraction. Then, the printed wiring boards corresponding to the non-fraction are panelized according to the same shape in the predetermined manufacturing block. Further, the CPU 31 handles printed wiring boards whose manufacturing quantity is smaller than a total number of pieces which can be panelized in a predetermined manufacturing block according to the same shape as the fraction also. Further, if the order remainder list 36 includes a record about ultra minority printed wiring boards whose manufacturing quantity is 1 or 2, the CPU 31 handles that ultra minority printed wiring boards as the fraction.

In step S104, the CPU 31 carries out a subroutine of the grouping processing. Fig. 8 is a flow chart showing the sub-routine of the grouping processing. As shown in Fig. 8, the CPU 31 includes a printed wiring board which satisfies the customer filter condition (YES in step S201) and satisfies the manufacturer filter condition (YES in step S202) in any of group Xn (n = 1, 2, ..., n) (step S203). For example, the CPU 31

includes printed wiring boards having the same shipment date and m layers (m = 1, 2, ..., m) in different groups.

On the contrary, if it is determined that a certain printed wiring board cannot be panelized together with the other printed wiring board in processing of steps S201 and S202 (pairing is impossible), the printed wiring board determined in such a way is not included in any group and then is panelized by a single piece in the predetermined manufacturing block (single-piece panelizing) and then, the processing proceeds to step S106.

If the grouping is completed for all the printed wiring boards determined to be fraction in this way, the sub-routine of the grouping processing is finished and then, the processing proceeds to step S105.

In step S105, the CPU 31 carries out the pairing processing. That is, the CPU 31 lays out final product data for printed wiring boards grouped in step S104, belonging to each group X1, X2, ..., Xn in a predetermined panelize data. Consequently, as shown in Fig. 8, multiple kinds of the printed wiring boards are panelized in the predetermined manufacturing block.

In step S106, a lot number (management number) is allocated to each panelize data in which panelizing for the same shape, panelizing for variable different shapes or panelizing for a single piece is carried out. The lot number contains the following information as absolutely necessary information.
a: predetermined sizes (size of outline, thickness)

b: panelize drawing number (definition of panelize home position and the like)

c: disposition of final product on the panelize drawing

d: key word for drawing number master access (key word for accessing to the panelize data library 34 and single-part drawing number data library 35)

According to this embodiment, multiple systems for the lot number are prepared depending on the panelize method (panelizing for the same shape, panelizing for variable different shapes, or panelizing for single piece) so that by recognizing the lot number, the panelize method can be recognized.

In step S107, the CPU 31 supplies a lot number allocated to each predetermined manufacturing block to the PAS system B as a creation instruction for the CAM data/CAT data corresponding to a panelize result.

In this way, each time when scheduling for manufacturing of the printed wiring board is carried out, the production control system A carries out fraction processing so as to detect a printed wiring board (including ultra minority products) corresponding to the fraction. After that, panelizing for different shapes is carried out for the printed wiring board corresponding to the fraction by grouping processing and pairing processing.

A content (pairing) of this panelizing for different shapes is changed depending on a content of the order remainder list 36 for use on scheduling. Thus, the inventor of the present

invention calls the method for panelizing for different shapes "panelizing for variable different shapes".

[Processing by PAS system]

Next, a processing by the PAS system B will be described with reference to Fig. 5. The disposing processing unit 41 of the PAS system B receives a lot number corresponding to each panelize data from the production control system A as an instruction for disposition. Then, the PAS system B carries out a processing following the flow chart of Fig. 10.

That is, the disposing processing unit 41 of the PAS system B picks out a lot number in the order of shipment date (step S301). Subsequently, the disposing processing unit 41 accesses the panelize data library 34 and single piece drawing number data library 35 using a key word contained in the lot number so as to read out panelize data and final product data corresponding to that lot number (step S302).

For example, if the lot number corresponds to panelize data for panelizing for variable different shapes, a panelize data corresponding to this lot number (see Fig. 11(A)) and final product data (see Fig. 11(B)) about multiple kinds of printed wiring boards, which are to be panelized in this panelize drawing (predetermined manufacturing block) according to different shapes, are read out.

Next, the disposing processing unit 41 puts each final product data in the panelize data (step S303). At this time, each final product data is laid out in such a condition that a home position thereof coincides with a panelize home position

set up in the panelize data (see Fig. 11(C)). Consequently, CAD data corresponding to the lot number is created.

Next, the data converting unit 42 receives the CAD data from the disposing processing unit 41 and converts this CAD data to CAM data or CAT data (step S304). That is, the CAM data and CAT data for use in each process of the manufacturing unit group C are produced from the CAD data.

After that, the data converting unit 42 produces the CAM data and CAT data corresponding to a lot number and accumulates the CAM data and CAT data in the memory 43 (step S305).

After that, whether or not all lot numbers received from the production control system A are subjected to processing by the disposing processing unit 41 and data converting unit 42 is determined (step S306). At this time, if the processing is not carried out, the processing is returned to step S301, and if the processing is carried out, the processing by the PAS system B shown in Fig. 11 is terminated.

In this manner, the CAM data and CAT data about lot numbers corresponding to panelizing for the same shape, panelizing for variable different shapes and panelizing for single piece are created and then accumulated in the memory 43.

[Processing by manufacturing unit group]

Next, processing and operation of the respective apparatuses 21-29 of the manufacturing unit group C will be described.

<Internal layer circuit forming unit>

A buffer 21 of the internal layer circuit forming unit

11 accumulates at least one of CAM data for forming an internal layer circuit which is held by the memory 43 of the PAS system B and a lot number corresponding to each of the CAM data. Each of the CAM data includes data about conductor pattern in the internal layer circuit.

For example, if a board coated with photo-setting optical sensitive film is disposed at a predetermined position through manufacturing line, the internal layer circuit forming unit 11 detects a lot number attached to the board. The internal layer circuit forming unit 11 reads out the CAM data corresponding to the detected lot number from the buffer 21. Then, the internal layer circuit forming unit 11 irradiates the optical sensitive film with laser beam by raster scanning or vector scanning according to the read out the CAM data so as to draw a conductor pattern for the internal layer circuit.

As a result, if a portion of the optical sensitive film irradiated with the laser beam is hardened and then developed, only the hardened portion (positive pattern) is left. The remaining portion is used as etching resist. After that, patterning material is etched according to the etching resist and then, etching resist is removed. In this way, a conductor pattern for the internal layer circuit is formed.

<Internal layer inspecting unit>

A buffer 22 of the internal layer inspecting unit 12 accumulates at least one of CAT data for inspecting an internal layer circuit which is held by the memory 43 of the PAS system B and a lot number corresponding to each of the CAT data. Each

of the CAT data includes data for conductor pattern formed in the internal layer circuit forming process in the step S1.

For example, if a board passing the internal layer circuit process (step S1) is transported through the manufacturing line, the internal layer inspecting unit 12 detects a lot number attached to the board. After that, the internal layer inspecting unit 12 scans a conductor pattern of the board, reads out the CAT data corresponding to the detected lot number from the buffer 22 and carries out pattern matching. Thereby, the breaking or short-circuit of the internal layer circuit is inspected.

<Drilling unit>

A buffer 23 of the drilling unit 13 accumulates at least one of CAM data for drilling held by the memory 43 of the PAS system B and a lot number corresponding to each CAM data. Each CAM data includes data about drilling position for a through hole in the board and drill diameter.

For example, if a board (laminated board) passing the lamination process (step S4) of the manufacturing line is disposed at a predetermined position, the drilling unit 13 detects a lot number attached to the laminated board. The drilling unit 13 reads out the CAM data corresponding to the detected lot number from the buffer 23. After that, the drilling unit 13 forms at least one of through holes having a predetermined diameter at a predetermined position of the board according to the read out CAM data.

<Outer layer circuit forming unit>

A buffer 24 of the internal layer circuit forming unit 14 accumulates at least one of CAM data for forming an outer layer circuit which is held by the memory 43 of the PAS system B and a lot number corresponding to each CAM data. Each CAM data includes data about a conductor pattern of the outer layer circuit.

The outer layer circuit forming unit 14 forms etching resist according to the same method as the internal layer circuit forming unit 11 uses. After that, etching is carried out according to the etching resist and the etching resist is removed so as to form a conductor pattern of the outer layer circuit.

<Outer layer inspecting unit>

A buffer 25 of the outer layer inspecting unit 15 accumulates at least one of CAT data for inspecting an outer layer circuit which is held by the memory 43 of the PAS system B and a lot number corresponding to each CAT data. Each CAT data includes data about conductor pattern formed in the outer layer circuit forming process in step S7.

When a laminated board in which the outer layer circuit is formed is transported through the manufacturing line, the outer layer inspecting unit 15 detects a lot number attached to the laminated board. The outer layer inspecting unit 15 carries out pattern matching by scanning the conductor pattern of the outer layer circuit and reading out the CAT data corresponding to the detected lot number from the buffer 25. Consequently, a breaking or short-circuit of the outer layer

circuit are inspected.

<Solder resist (SR) forming unit>

A buffer 26 of the SR forming unit 16 accumulates at least one of CAM data for forming the solder resist which is held by the memory 43 of the PAS system B and a lot number corresponding to each CAM data. Each CAM data includes data about solder resist pattern covering the outer layer circuit.

When a laminated board passing the outer layer inspection is transported through the manufacturing line, the SR forming unit 16 detects a lot number attached to the board and covers the surface of the laminated board with photo-setting optical sensitive film. Subsequently, the SR forming unit 16 reads out CAM data corresponding to the detected lot number from the buffer 26 and irradiates with laser beam according to the read out CAM data (for drawing a SR pattern).

Then, a portion irradiated with laser beam of the optical sensitive film is hardened and made into characteristic of absorbing ultraviolet ray. Using this optical sensitive film as shielding mask, the laminated board coated with ultraviolet curing SR material on the surface is subjected to ultraviolet ray exposure processing. Then, a portion irradiated with ultraviolet ray of the SR material is hardened and if developed, only the portion irradiated with ultraviolet ray is left. In this manner, the solder resist is formed.

<Marking unit>

A buffer 27 of the marking unit 17 accumulates at least one of CAM data for marking which is held by the memory 43 of

the PAS system B and a lot number corresponding to each CAM data. Each CAM data includes data about pattern (marking pattern) of characters and symbols printed on a laminated board by marking.

When a laminated board passing the SR forming process (step S10) is transported through the manufacturing line, the marking unit 27 detects a lot number attached to the transported laminated board. Subsequently, the marking unit 27 coats a predetermined position on the surface of the laminated board with photo-setting marking ink, reads out the CAM data corresponding to the detected lot number from the buffer 27 and irradiates with laser beam according to the CAM data (for drawing a marking pattern). Then, a portion irradiated with laser beam of the marking ink is hardened. After that, if developing processing is carried out, only the portion irradiated with laser beam is left, so that marking on the laminated board is completed.

<Outline processing unit>

The outline processing unit 18 contains a V cut unit and router. A buffer 28 of the outline processing unit 18 accumulates V cut data held by the memory 43, CAM data for cutting individual pieces by the router and lot numbers corresponding to these. The CAM data includes XY coordinate data indicating a V cut position relative to the laminated board and XY coordinate data indicating a cutting position relative to the laminated board.

If a laminated board is disposed at a predetermined position through the manufacturing line, the V cut unit reads

out CAM data corresponding to a lot number attached to the laminated board from the buffer 28 and incises the laminated board according to this CAM data. Consequently, cutting lines are made in the final product to separate it to multiple individual pieces as required by customer.

If a laminated board is disposed at a predetermined position through the manufacturing line, CAM data corresponding to a lot number attached to the laminated board is read out from the buffer 28 and a single piece or multiple pieces are cut out from the laminated board according to this CAM data. Consequently, a single piece or multiple pieces of laminated boards having an outline of its final product are obtained.

<Wire logic testing unit>

A buffer 29 of the wire logic testing unit 19 accumulates CAT data for flying prover (step S14) held by the memory 43 and corresponding lot number. The CAT data includes wire logic master data, open/short check data and the like.

If individual pieces cut out by the router are transported through the manufacturing line, the lot numbers attached to the individual pieces are detected in the wire logic testing unit 19 and CAT data corresponding to each lot number is read out from the buffer 29 and wire logic test for each of the individual pieces is carried out according to the CAT data.

[Operation of production system]

Next, an example of operation of the entire production system for the printed wiring board will be described.

<First example of operation>

If a start instruction for manufacturing is inputted into the production control system A, a processing shown in Fig. 6 is carried out by the production control system A. Consequently, panelize data (panelizing for the same kind, panelizing for variable different shapes, panelizing for single piece) is prepared corresponding to the content of the order remainder list 36 and then, a lot number is allocated to each panelize data.

After that, if each lot number is supplied to the PAS system B, the PAS system B creates the CAM data and CAT data corresponding to each lot number and accumulates them in the memory 43.

After that, the PAS system B accumulates the CAM data and CAT data corresponding to a certain lot number in the respective buffers 21-29 of the manufacturing unit group C according to a predetermined manufacturing order.

As a result, the respective apparatuses 11-19 come to hold the CAM data and CAT data corresponding to the printed wiring board before manufacturing process for the printed wiring board is started.

After that, when a board (,laminated board or individual pieces) provided with a lot number is transported through the manufacturing line, the respective units 11-19 of the manufacturing unit group C read out the CAM data and CAT data corresponding to that lot number from the buffer and carries out each process using the read out CAM data or CAT data.

Each units 11-19, unless corresponding CAM data or CAT

data is accumulated in the buffer at this time, requests to add the corresponding data to the PAS system B. The PAS system B supplies the corresponding data to corresponding buffer to meet the request.

After that, the CAM data and CAT data accumulated in the memory 43 and buffers 21-29 are deleted when a process using the CAT data or CAM data is terminated or entire process corresponding to a lot number is terminated. A deletion timing for the CAM data and CAT data held by the memory 43 and buffers 21-29 can be set up appropriately by manager of the production system.

<Second example of operation>

The second example of operation is the same as the first example of operation until CAM/CAT data corresponding to a lot number is accumulated to the memory 43 in the PAS system B. After that, CAM data corresponding to a certain lot number is supplied to the internal layer circuit forming unit 11 (buffer 21) so as to carry out the internal layer circuit forming process S1.

At this time, the production control system A monitors a formation of the internal layer circuit by the internal layer circuit forming unit 11. Before a board in which the internal layer circuit is formed first reaches the internal layer inspecting unit 12 through the manufacturing line, the CAT data for internal layer inspection corresponding to the corresponding lot number is accumulated in the buffer 22. If the board reaches the internal layer inspecting unit 12,

internal layer inspection is carried out using the CAT data accumulated in the buffer 22.

In this manner, the production control system A monitors process of each apparatus 11-19 of the manufacturing unit group C and supplies the corresponding CAM data and CAT data to a buffer of an apparatus corresponding to next process before material passing a certain process reaches next process.

At this time, when the production control system A gives an instruction to the PAS system B, the corresponding CAM data and CAT data are supplied from the memory 43 to the buffer. The units corresponding to the buffer may hold the CAM data or CAT data or alternatively, a processing unit or inspection unit of the manufacturing unit group C may request the PAS system B to supply the corresponding CAM data or CAT data and receive that supply according to the instruction from the production control system A.

Although in the above described example of operation, the processing shown in Fig. 6 is carried out when a start instruction for manufacturing is inputted into the production control system A, the start timing of the processing of Fig. 6 can be set up appropriately by manager of the production system.

[Operation of the embodiment]

According to the embodiment of the present invention, the production control system A carries out the processing shown in Fig. 6 at a predetermined timing (when manufacturing process of every day is started) to divide printed wiring boards

scheduled to be manufactured at that point of time into non-fraction and fraction.

Then, the non-fraction printed wiring board is panelized according to the same shape and the fraction printed wiring board is grouped depending on manufacturing condition thereof (customer filter condition and manufacturer filter condition), so that the printed wiring boards belonging to each group are panelized (pairing) according to different shapes in a predetermined manufacturing block.

Consequently, panelizing of the printed wiring board is carried out without generation of an incidental product. Therefore, waste due to the generation of incidental product can be prevented. Further, because the ultra minority products are treated as a fraction printed wiring board and panelized according to different shape, it is possible to suppress generation of such an incidental product or waste of material accompanied by production of the ultra minority products.

WHAT IS CLAIMED IS:

1. A manufacturing system for printed wiring board comprising:

a schedule data storage unit storing multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof;

a detecting unit detecting printed wiring boards of fraction which should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule data;

a condition data storage unit storing a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block;

a dividing unit dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and

a determining unit determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

2. A manufacturing system for printed wiring board according to claim 1, wherein said detecting unit, if a manufacturing quantity of the printed wiring boards of a certain kind cannot be divided completely by a maximum number of the printed wiring boards which can be laid out in a single

predetermined manufacturing block, detects printed wiring boards corresponding to a number smaller than said maximum number or an excess as printed wiring boards of said fraction.

3. A manufacturing system for printed wiring board according to claim 1, wherein the manufacturing condition data is data produced by combining manufacturing request person's condition and manufacturer's condition.

4. A manufacturing system for printed wiring board according to claim 3 wherein the manufacturing request person's condition is shipment date.

5. A manufacturing system for printed wiring board according to claim 3, wherein the manufacturer's condition is number of layers of the printed wiring boards.

6. A manufacturing system for printed wiring board according to claim 4, wherein the manufacturer's condition is number of layers of the printed wiring boards.

7. A manufacturing system for printed wiring board according to claim 1 further comprising:

a CAD data creating unit creating CAD data corresponding to a combination determined by said determining unit; and

a CAD data converting unit creating CAM data or CAT data corresponding to CAD data created by said CAD data creating unit.

8. A manufacturing system for printed wiring board according to claim 7 further comprising:

manufacturing unit group carrying out manufacturing process for the printed wiring board using the CAM data or CAT

data created by said CAD data converting unit.

9. A manufacturing method for printed wiring board comprising the steps of:

reading multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof;

detecting printed wiring boards of fraction which should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule data;

reading a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block;

dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and

determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

10. A computer-readable recording medium for recording a computer program for making a computer to carry out the steps of:

reading multiple manufacturing schedule data including the kind of a printed wiring board scheduled to be manufactured and manufacturing quantity thereof;

detecting printed wiring boards of fraction which should be laid out in a single predetermined manufacturing block together with printed wiring boards of different kind from multiple kinds of the printed wiring boards scheduled to be manufactured, according to multiple manufacturing schedule data;

reading a manufacturing condition data for laying out the printed wiring boards of different kinds in a single predetermined manufacturing block;

dividing the detected fraction printed wiring boards to multiple groups according to the manufacturing condition data; and

determining a combination of the printed wiring boards of different kinds to be laid out in a single predetermined manufacturing block for each group.

ABSTRACT OF THE DISCLOSURE

A manufacturing system for printed wiring board of this invention divides printed wiring boards scheduled to be manufactured to non-fraction and fraction depending on a content of an order remainder list. The printed wiring boards divided to the non-fraction are panelized according to the same shape while the printed wiring boards divided to the fraction are grouped corresponding to manufacturing condition thereof. Then, each group of the printed wiring boards are panelized (pairing) according to different shape in a predetermined manufacturing block. Consequently, generation of incidental product or waste of material can be prevented.

FIG. 1

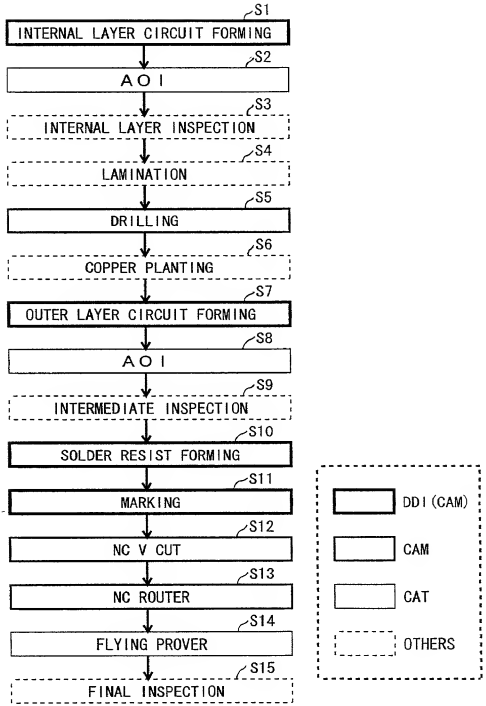

S1
INTERNAL LAYER CIRCUIT FORMING
S2
AOI
S3
INTERNAL LAYER INSPECTION
S4
LAMINATION
S5
DRILLING
S6
COPPER PLANTING
S7
OUTER LAYER CIRCUIT FORMING
S8
AOI
S9
INTERMEDIATE INSPECTION
S10
SOLDER RESIST FORMING
S11
MARKING
S12
NC V CUT
S13
NC ROUTER
S14
FLYING PROVER
S15
FINAL INSPECTION
DDI (CAM)
CAM
CAT
OTHERS

FIG. 2

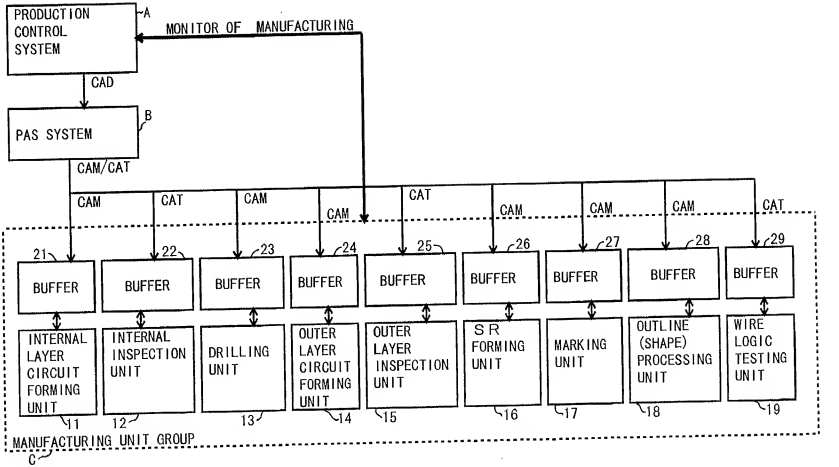

PRODUCTION CONTROL SYSTEM
A
MONITOR OF MANUFACTURING
CAD
PAS SYSTEM
B
CAM/CAT
CAM
CAT
CAM
CAM
CAT
CAM
CAM
CAM
CAT
21
22
23
24
25
26
27
28
29
BUFFER
BUFFER
BUFFER
BUFFER
BUFFER
BUFFER
BUFFER
BUFFER
BUFFER
INTERNAL LAYER CIRCUIT FORMING UNIT
INTERNAL INSPECTION UNIT
DRILLING UNIT
OUTER LAYER CIRCUIT FORMING UNIT
OUTER LAYER INSPECTION UNIT
SR FORMING UNIT
MARKING UNIT
OUTLINE (SHAPE) PROCESSING UNIT
WIRE LOGIC TESTING UNIT
11
12
13
14
15
16
17
18
19
MANUFACTURING UNIT GROUP
C

FIG. 3

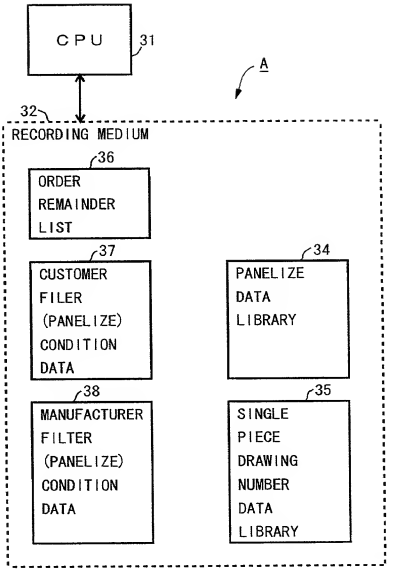

CPU
31
A
32
RECORDING MEDIUM
36
ORDER REMAINDER LIST
37
CUSTOMER FILER (PANELIZE) CONDITION DATA
34
PANELIZE DATA LIBRARY
38
MANUFACTURER FILTER (PANELIZE) CONDITION DATA
35
SINGLE PIECE DRAWING NUMBER DATA LIBRARY

FIG. 4

ORDER REMAINDER LIST 36

No.	DRAWING NUMBER	MANUFACT-URING QUANTITY	ORDER RECEPTION DATE	SHIPMENT DATE	REMARKS
1	E320-1234-T567/01	1	99.09.09	99.10.12	REPRODUCTION BECAUSE OF DEFECT
2	E320-1234-T567/01	9	99.10.01	99.10.12	
.	.	.	.	.	
.	.	.	.	.	

FIG. 5

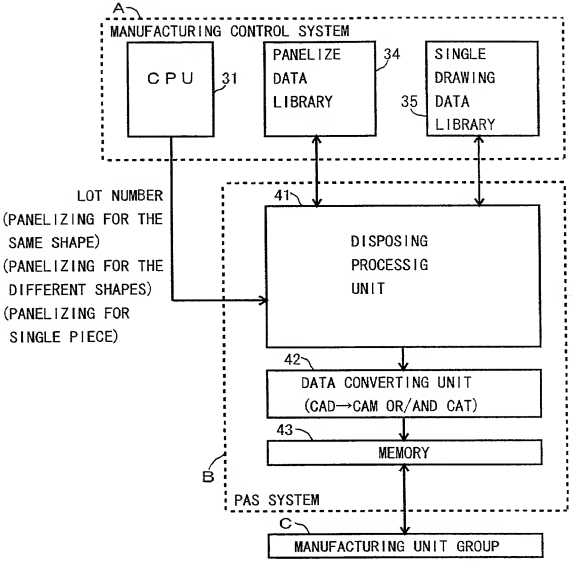

A
MANUFACTURING CONTROL SYSTEM
CPU
31
PANELIZE DATA LIBRARY
34
SINGLE DRAWING DATA LIBRARY
35
LOT NUMBER
(PANELIZING FOR THE SAME SHAPE)
(PANELIZING FOR THE DIFFERENT SHAPES)
(PANELIZING FOR SINGLE PIECE)
41
DISPOSING PROCESSIG UNIT
42
DATA CONVERTING UNIT
(CAD→CAM OR/AND CAT)
43
MEMORY
B
PAS SYSTEM
C
MANUFACTURING UNIT GROUP

FIG. 6

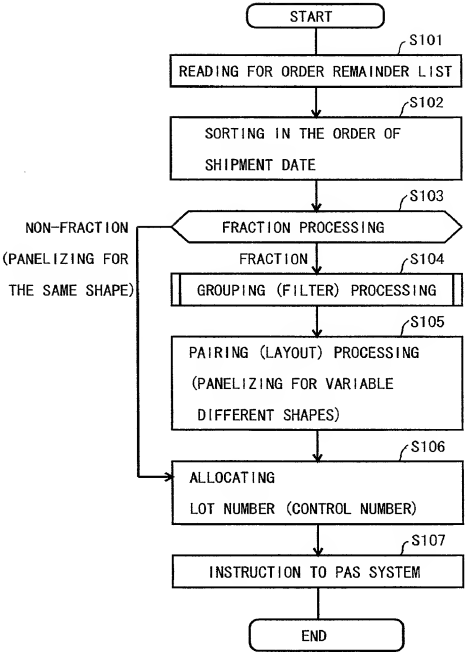

START
S101
READING FOR ORDER REMAINDER LIST
S102
SORTING IN THE ORDER OF SHIPMENT DATE
S103
NON-FRACTION (PANELIZING FOR THE SAME SHAPE)
FRACTION PROCESSING
FRACTION
S104
GROUPING (FILTER) PROCESSING
S105
PAIRING (LAYOUT) PROCESSING (PANELIZING FOR VARIABLE DIFFERENT SHAPES)
S106
ALLOCATING LOT NUMBER (CONTROL NUMBER)
S107
INSTRUCTION TO PAS SYSTEM
END

FIG. 7

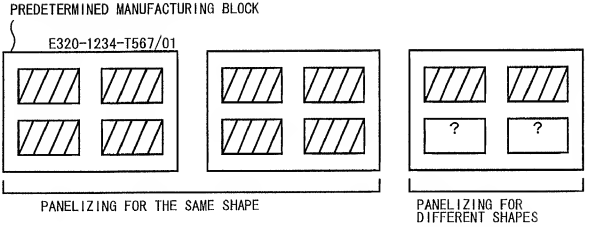

PREDETERMINED MANUFACTURING BLOCK
E320-1234-T567/01
?
?
PANELIZING FOR THE SAME SHAPE
PANELIZING FOR
DIFFERENT SHAPES

FIG. 8

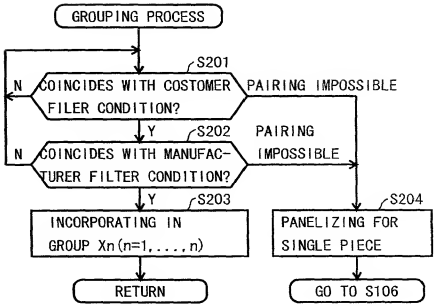

GROUPING PROCESS
S201
N
COINCIDES WITH COSTOMER FILER CONDITION?
PAIRING IMPOSSIBLE
Y
S202
PAIRING IMPOSSIBLE
N
COINCIDES WITH MANUFACTURER FILTER CONDITION?
Y
S203
INCORPORATING IN GROUP Xn(n=1,....,n)
S204
PANELIZING FOR SINGLE PIECE
RETURN
GO TO S106

FIG. 9

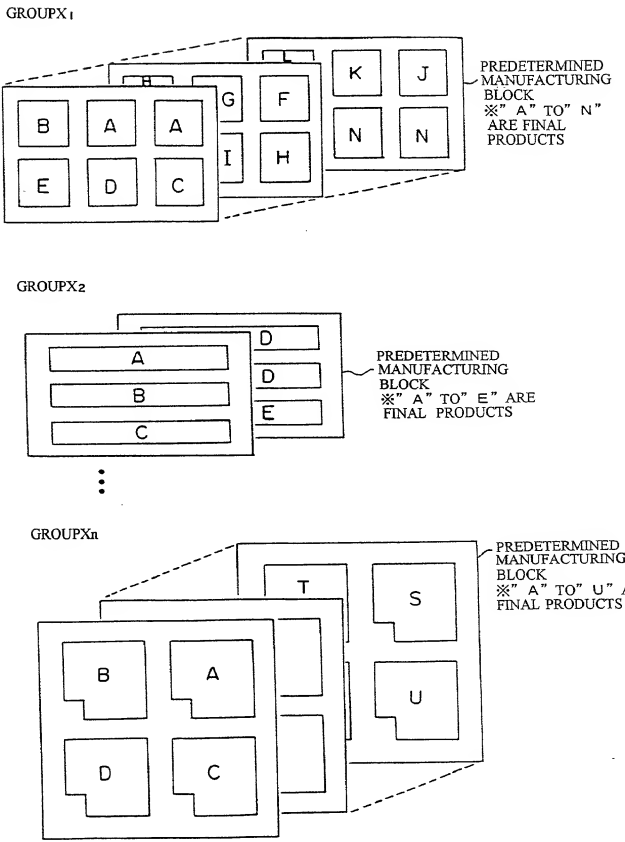

GROUPX1
B
A
A
E
D
C
G
F
I
H
K
J
N
N
PREDETERMINED MANUFACTURING BLOCK
※" A" TO" N" ARE FINAL PRODUCTS
GROUPX2
A
B
C
D
D
E
PREDETERMINED MANUFACTURING BLOCK
※" A" TO" E" ARE FINAL PRODUCTS
GROUPXn
B
A
D
C
T
S
U
PREDETERMINED MANUFACTURING BLOCK
※" A" TO" U" ARE FINAL PRODUCTS

FIG. 10

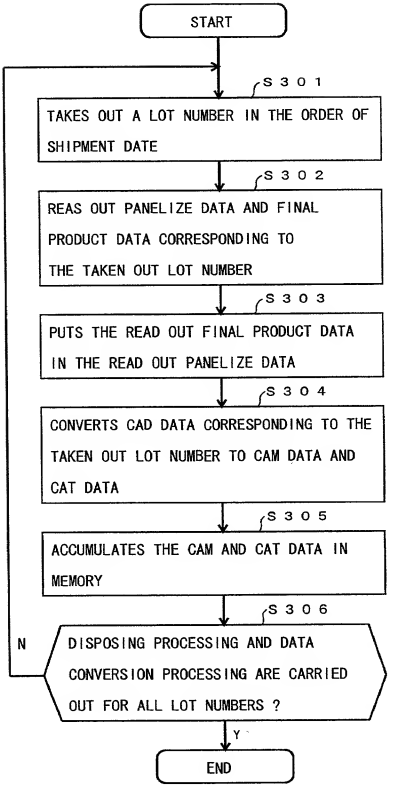
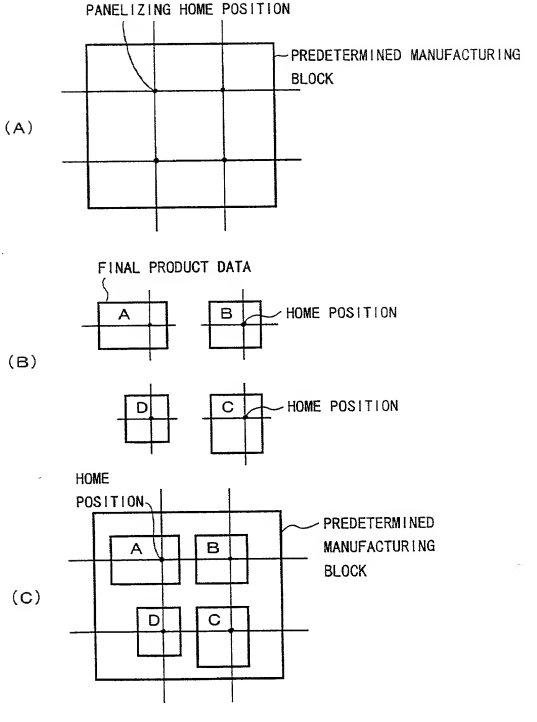

START
S301
TAKES OUT A LOT NUMBER IN THE ORDER OF SHIPMENT DATE
S302
REAS OUT PANELIZE DATA AND FINAL PRODUCT DATA CORRESPONDING TO THE TAKEN OUT LOT NUMBER
S303
PUTS THE READ OUT FINAL PRODUCT DATA IN THE READ OUT PANELIZE DATA
S304
CONVERTS CAD DATA CORRESPONDING TO THE TAKEN OUT LOT NUMBER TO CAM DATA AND CAT DATA
S305
ACCUMULATES THE CAM AND CAT DATA IN MEMORY
S306
DISPOSING PROCESSING AND DATA CONVERSION PROCESSING ARE CARRIED OUT FOR ALL LOT NUMBERS ?
N
Y
END

FIG. 11


PANELIZING HOME POSITION
PREDETERMINED MANUFACTURING BLOCK
(A)
FINAL PRODUCT DATA
A
B
HOME POSITION
(B)
D
C
HOME POSITION
HOME POSITION
PREDETERMINED MANUFACTURING BLOCK
A
B
(C)
D
C

Declaration and Power of Attorney for U.S. Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name.

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者（下記の氏名が一つの場合）もしくは最初かつ共同発明者であると（下記の名称が複数の場合）信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

PRODUCTION SYSTEM FOR PRINTED WIRING BOARD

上記発明の明細書（下記の欄でx印がついていない場合は、本書に添付）は、

the specification of which is attached hereto unless the following box is checked:

☐ __月__日に提出され、米国出願番号または特許協定条約国際出願番号を_____とし、
（該当する場合）_____ に訂正されました。

☐ was filed on _____
as United States Application Number or
PCT International Application Number
_____ and was amended on
_____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第３７編第１条５６項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration
(日本語宣言書)

私は、米国法典第３５編１１９条(a)-(d)項又は３６５条(b)項に基き下記の、米国以外の国の少なくとも一ヵ国を指定している特許協力条約３６５(a)項に基ずく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここにお誤するとともに、優先権を主張している、本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

I hereby claim foreign priority under Title 35, United States Code, Section 119 (a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)
外国での先行出願

(Number) (番号)	(Country) (国名)	(Day/Month/Year Filed) (出願年月日)	Priority Not Claimed 優先権主張なし
2000-51404	Japan	28/02/2000	☐
			☐

私は、第３５編米国法典１１９条(e)項に基いて下記の米国特許出願規定に記載された権利をここに主張いたします。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.) (出願番号)	(Filing Date) (出願日)

私は、下記の米国法典第３５編１２０条に基いて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約３６５条(c)に基ずく権利をここに主張します。また、本出願の各請求範囲の内容が米国法典第３５編１１２条第１項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内または特許協力条約国際提出日までの期間中に入手された、連邦規則法典第３７編１条５６項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of application.

(Application No) (出願番号)	(Filing Date) (出願日)	(Status: Patented, Pending, Abandoned) (現況：特許許可済、係属中、放棄済)
(Application No.) (出願番号)	(Filing Date) (出願日)	(Status Patented, Pending, Abandoned) (現況：特許許可済、係属中、放棄済)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration
(日本語宣言書)

委任状： 私は下記の発明者として、本出願に関する一切の手続きを米特許商標局に対して遂行する弁理士または代理人として、下記の者を指名いたします。（弁護士、または代理人の氏名及び登録番号を明記のこと）

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*
See list of attorneys and/or agents on page 5.

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